

Pollution Abatement and Control Expenditures, 1972-78

REAL spending for pollution abatement and control (PAC) increased 5 percent in 1978, compared with 2 percent in 1977 and an average annual rate of 6 percent during 1972-77 (chart 7).¹ Pollution abatement (PA) spending, the largest category of spending for PAC, also increased 5 percent in 1978 (to \$24.0

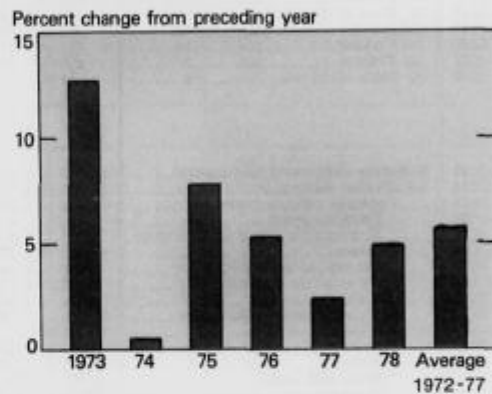
billion in 1972 dollars); regulation and monitoring increased 3 percent (to \$0.6 billion); and research and development, 3 percent (to \$1.0 billion). Water PA spending increased 9 percent; air, 1 percent; and solid waste collection and disposal, 4 percent. Other and unallocated PA spending decreased 1 percent. These constant-dollar estimates are shown in tables 1 and 2, with corresponding current-dollar estimates and selected implicit price deflators.

Prices.—As measured by the implicit price deflator, prices of PAC goods and services increased 7.4 percent in 1978, about the same as in 1977 but lower than the average annual rate of 8.9 percent during 1972-77 (table 3). In addition to changes in the prices of PAC goods and services, the implicit price deflator reflects shifts in the composition of purchases of these goods and services. Two alternative measures of price change remove the effects of such shifts. The chain price index removes them *in adjacent years* by weighting price changes of PAC components as in the earlier year, and the fixed-weighted index removes them by weighting price changes as in the base year, 1972.

1. PAC expenditures are for reducing the emission of pollutants and for the collection and disposal of solid wastes by means acceptable to Federal, State, and local authorities; they exclude expenditures for other aspects of environmental control such as conservation of natural resources or the protection of endangered species. (See "Conceptual and Statistical Issues in Developing Environmental Measures—Recent U.S. Experience," by John E. Creameans, *Review of Income and Wealth*, June 1977, for discussion of distinctions between pollutants and other wastes and between PAC and other aspects of environmental protection.) PAC spending consists of pollution abatement expenditures, which reduce emissions directly, plus expenditures for regulation and monitoring and for research and development, which lead indirectly to the reduction of emissions. Because data are not available, the national estimates exclude expenditures by agricultural business (except feedlot operations); real estate operators; private medical, legal, educational, and cultural services; and nonprofit organizations.

New users of the pollution abatement and control (PAC) expenditures series should be aware that it is based directly, or indirectly via estimation procedures, on survey sources. Accordingly, like many similarly-based series, it is potentially subject to several kinds of error. *Reporting error* reflects inaccuracy theoretically traceable to a survey respondent. Definitional and measurement problems faced by designers of PAC surveys, but ultimately by respondents themselves, are discussed in "Capital Expenditures by Business for Air and Water Pollution Abatement, 1973 and 1974," in the July 1974 SURVEY OF CURRENT BUSINESS. *Sampling error* reflects discrepancy between totals theoretically obtainable from all respondents and estimation of totals derived from a sample of respondents. A discussion of sampling error for parts of PAC expenditures is in *Pollution Abatement Cost and Expenditures, 1977* by the Bureau of Census. *Assumption error* reflects inadequacy of assumptions employed in indirect estimation procedures. Parts of PAC expenditures are based on information not specifically applicable to PAC, and assumptions underlie the estimating procedures needed to utilize this information. Assumptions are also made in the development of constant-dollar estimates. A discussion of concepts and methods upon which constant-dollar estimates of PAC expenditures are based is in "Pollution Abatement and Control Expenditures in Constant and Current Dollars, 1972-77," in the February 1979 SURVEY.

CHART 7
Percent Change in Real PAC Expenditures



U.S. Department of Commerce, Bureau of Economic Analysis

80-27

The implicit price deflator increased at the same rate as the chain price index in 1978 because the compositional shifts in real spending were offsetting in their effect on the implicit price deflator. Each year during 1972-77, except 1973, the implicit price deflator increased less than the chain price index, reflecting yearly compositional shifts toward goods that are low-priced in the sense that their prices increased relatively less than other PAC goods. Similarly, the implicit price deflator increased less than the fixed-weighted index because the predominant compositional shift relative to 1972 was toward low-priced goods. Although PAC spending includes spending that would be done in the absence of Federal, State, and local laws, the compositional shifts in PAC purchases during 1972-78 largely reflect the effects of laws regulating pollution abatement and waste disposal practices and authorizing Federal funding. Regulations, because they

Table 1.—National Expenditures for Pollution Abatement and Control in

Line		1972 *					1973 *					1974 *				
		Total	Air	Water	Solid waste	Other and unallo- cated †	Total	Air	Water	Solid waste	Other and unallo- cated †	Total	Air	Water	Solid waste	Other and unallo- cated †
Millions of																
1	Pollution abatement and control	18,582	8,610	8,496	3,495	-224	22,269	8,638	8,989	3,882	-225	26,368	10,468	11,468	4,382	-304
2	Pollution abatement	17,522	8,597	8,410	3,458	-412	20,826	7,785	8,681	3,941	-453	24,573	9,719	11,008	4,321	-504
3	Personal consumption	1,536	1,530				2,085	2,085				2,085	2,085			
4	Durable goods	476	470				870	870				860	860			
5	Nondurable goods and services	1,060	1,060				1,215	1,215				1,227	1,227			
6	Business	11,083	4,278	4,908	2,214	-415	12,433	5,570	5,089	2,033	-470	15,207	6,882	6,175	2,679	-538
7	On capital account	5,734	2,644	2,770	1,315		7,023	3,527	3,142	142		7,381	3,617	3,149	149	
8	On current account	5,349	1,632	2,138	2,000	-415	5,410	2,053	2,168	2,240	-470	5,018	3,027	3,027	2,460	-538
9	Private	5,013	1,612	1,004	1,000		5,265	2,022	1,203	2,260		5,008	2,905	1,454	2,400	
10	Government enterprise	1,149	20	1,138	(*)	(*)	1,345	30	1,916	(*)	(*)	1,442	65	1,673	(*)	(*)
11	Costs recovered	-415				-415	-470				-470	-538				-538
12	Government	4,773	125	3,501	1,144	3	5,400	141	3,974	1,275	0	5,499	171	4,833	1,441	4
13	Federal	1,139	50	70	5	3	1,213	47	134	16	0	1,204	56	104	38	4
14	State and local	1,311	(*)	171	1,140	(*)	1,483	(*)	171	1,263	(*)	1,552	(*)	183	1,403	(*)
15	Government enterprise fixed capital	3,823	69	3,255			3,763	0	3,670			4,422	114	4,422		
16	Regulation and monitoring	267	143	144	14	66	490	105	180	18	112	655	163	247	21	138
17	Federal	200	45	70	0	84	379	50	90	14	116	546	63	135	22	138
18	State and local	167	98	70	5	2	213	113	91	4	3	249	131	112	5	(*)
19	Research and development	823	631	142	27	123	983	283	165	33	123	988	540	353	25	202
20	Private	810	411	14	12	33	880	451	70	12	35	908	492	67	13	46
21	Federal	205	104	34	5	62	290	126	63	11	60	343	100	78	17	146
22	State and local	99	17	44	10	28	61	0	30	0	18	39	7	18	5	0
Millions of constant																
23	Pollution abatement and control	18,582	8,610	8,496	3,495	-224	22,269	8,667	8,921	3,721	-177	21,027	8,400	8,815	3,696	-84
24	Pollution abatement	17,522	8,597	8,410	3,458	-412	20,826	7,355	8,090	3,573	-401	20,072	7,237	8,171	3,543	-379
25	Personal consumption	1,536	1,530				1,985	1,905				2,110	2,110			
26	Durable goods	476	470				870	870				851	851			
27	Nondurable goods and services	1,060	1,060				1,205	1,295				1,405	1,405			
28	Business	11,083	4,278	4,908	2,214	-415	12,086	5,266	5,204	2,482	-407	12,083	5,082	5,031	2,383	-385
29	On capital account	5,734	2,644	2,770	1,315		6,787	3,406	2,886	3,373		5,153	3,182	3,619	332	
30	On current account	5,349	1,632	2,138	2,000	-415	5,028	1,847	2,378	2,110	-407	5,841	1,901	2,411	2,011	-583
31	Private	5,013	1,612	1,004	1,000		5,066	1,823	1,128	2,100		5,025	1,870	1,140	2,018	
32	Government enterprise	1,149	20	1,138	(*)	(*)	1,266	25	1,241	(*)	(*)	1,599	23	1,208	(*)	(*)
33	Costs recovered	-415				-415	-407				-407	-382				-382
34	Government	4,773	125	3,501	1,144	3	5,085	134	3,604	1,191	0	5,482	138	4,140	1,180	4
35	Federal	1,139	54	75	5	3	1,190	45	124	16	0	1,217	66	105	22	2
36	State and local	1,311	(*)	171	1,140	(*)	1,481	(*)	165	1,775	(*)	1,265	(*)	137	1,148	(*)
37	Government enterprise fixed capital	3,823	69	3,255			3,504	80	3,415			3,900	92	3,838		
38	Regulation and monitoring	267	143	144	14	66	458	154	178	17	108	515	150	214	22	120
39	Federal	200	45	70	0	84	361	47	83	14	106	498	46	119	20	120
40	State and local	167	98	70	5	2	217	108	95	3	3	215	111	95	4	(*)
41	Research and development	823	631	142	27	123	888	248	165	31	115	948	507	321	20	172
42	Private	810	411	14	12	33	884	234	96	10	33	912	415	48	11	26
43	Federal	205	104	34	5	62	258	118	69	11	65	294	85	67	15	136
44	State and local	99	17	44	10	28	61	0	31	8	17	34	9	16	4	0
Selected																
45	Pollution abatement and control	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
46	Pollution abatement	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
47	Personal consumption	100.0	100.0				100.0	100.0				100.0	100.0			
48	Business	100.0	100.0	100.0	100.0		100.0	100.0	100.0	100.0		100.0	100.0	100.0	100.0	100.0
49	On capital account	100.0	100.0	100.0	100.0		100.0	100.0	100.0	100.0		100.0	100.0	100.0	100.0	100.0
50	On current account	100.0	100.0	100.0	100.0		100.0	100.0	100.0	100.0		100.0	100.0	100.0	100.0	100.0
51	Government	100.0	100.0	100.0	100.0		100.0	100.0	100.0	100.0		100.0	100.0	100.0	100.0	100.0
52	Regulation and monitoring	100.0	100.0	100.0	100.0		100.0	100.0	100.0	100.0		100.0	100.0	100.0	100.0	100.0
53	Research and development	100.0	100.0	100.0	100.0		100.0	100.0	100.0	100.0		100.0	100.0	100.0	100.0	100.0
Addendum																
54	Valued at replacement cost in current dollars	1,430					1,730					2,221				
55	Valued at replacement cost in constant (1973) dollars	1,430					1,850					1,874				

* Revised.

† Preliminary.

* Less than \$500,000.

1. Includes expenditures for air and water pollution abatement and control. Includes expenditures for solid waste collection and disposal by means acceptable to Federal, State, and local authorities. Excludes agricultural business (except for feedlot operations); real estate operators; private medical, legal, educational, and cultural services; and nonprofit organizations.

2. "Other" includes expenditures for abatement and control of noise, radiation, and pesticide pollution; "unallocated" includes business expenditures not assigned to media.

3. Expenditures are attributed to the sector that performs the air or water pollution abatement or solid waste collection and disposal.

4. Current dollar estimates divided by constant (1973) dollar estimates.

5. To facilitate conversion of expenditures to a cost basis.

Current and Constant (1972) Dollars and Selected Implicit Price Deflators

1975 *					1976 *					1977 *					1978 *					Line
Total	Air	Water	Solid waste	Other and unallocated ²	Total	Air	Water	Solid waste	Other and unallocated ²	Total	Air	Water	Solid waste	Other and unallocated ²	Total	Air	Water	Solid waste	Other and unallocated ²	
current dollars																				
20,639	12,806	12,236	4,994	-217	34,163	14,956	15,201	5,266	-270	37,541	16,362	16,361	4,992	-275	41,277	18,771	19,201	6,670	-265	1
26,874	12,046	12,795	4,722	-600	32,102	13,194	14,507	3,190	-828	35,237	14,408	15,796	4,916	-835	39,700	15,563	18,574	0,581	-1,037	2
3,493	3,403				3,004	3,094				4,311	4,211				4,049	4,040				3
1,301	1,301				1,821	1,821				2,108	2,108				2,412	2,412				4
2,192	2,102				2,173	2,173				2,145	2,145				2,237	2,237				5
17,839	8,349	7,012	3,141	-682	19,708	8,918	8,245	3,519	-867	22,282	0,788	0,351	4,100	-657	24,770	10,034	10,566	4,621	-1,005	6
3,493	4,610	3,436	420		0,061	4,019	3,006	447		0,844	4,024	4,396	304		10,570	5,063	4,908	506		7
0,344	3,730	3,577	2,721	-625	10,730	4,239	4,203	3,071	-587	12,438	4,864	4,075	3,536	-857	14,200	5,502	5,036	4,046	-1,005	8
3,131	3,070	1,781	2,723		0,387	4,227	2,080	3,071		10,815	4,789	2,490	3,536		12,347	0,504	2,877	4,030		9
1,906	00	1,866	(*)		2,237	72	2,104	(*)		2,581	75	2,505	(*)		2,819	58	2,620	(*)		10
-593				-693	-887				-887	-908				-938	-1,006				-1,006	11
7,932	206	5,753	1,591	23	8,370	252	6,940	1,581	59	8,024	310	8,435	1,817	63	10,270	280	8,008	1,990	20	12
422	88	271	50	23	472	105	287	82	59	402	100	435	43	63	401	87	300	45	28	13
1,762	1	210	1,541	(*)	1,834	1	204	1,629	(*)	1,003	1	139	1,771	(*)	2,113	1	209	1,914	(*)	14
5,618	117	5,302			5,004	170	5,886			6,170	233	5,967			7,007	192	7,503			15
852	206	270	32	136	725	253	328	28	107	830	241	300	37	184	821	265	397	40	211	16
381	06	153	20	135	402	59	151	21	102	420	80	140	26	177	507	94	157	27	109	17
272	130	126	0	(*)	323	125	177	7	6	402	101	223	12	7	414	172	209	31	13	18
1,104	583	164	42	316	1,200	638	177	40	301	1,494	812	207	39	490	1,050	923	231	41	400	19
000	400	89	21	54	003	423	76	31	75	805	002	09	21	58	880	750	107	22	101	20
449	208	77	15	216	528	131	84	13	209	578	144	90	14	250	611	160	105	10	391	21
47	8	10	0	14	45	9	38	4	17	61	7	13	4	23	58	5	10	4	29	22

(1972) dollars

22,070	8,975	16,953	3,715	-84	23,880	8,389	16,747	3,882	-36	24,461	9,089	16,792	4,171	-91	25,652	9,633	11,099	4,305	-134	23
21,300	8,398	8,709	3,068	-433	22,420	8,760	10,320	3,539	-511	22,821	8,975	10,306	4,118	-521	24,020	9,094	11,300	4,299	-564	24
2,690	2,683				2,857	2,857				2,945	2,945				2,900	2,900				25
1,184	1,184				1,459	1,459				1,883	1,883				1,740	1,740				26
1,406	1,406				1,380	1,380				1,262	1,262				1,250	1,250				27
12,060	5,622	5,086	2,425	-404	13,327	4,721	4,570	2,301	-565	13,923	4,634	5,514	2,840	-503	14,480	5,941	0,116	3,014	-582	28
3,381	3,474	2,695	312		0,470	3,324	2,527	310		0,180	3,344	2,871	371		5,000	3,240	2,007	394		29
6,300	2,185	2,491	2,114	-434	6,537	2,307	2,743	2,272	-343	7,348	2,400	2,946	2,475	-603	7,858	2,701	3,118	2,650	-562	30
0,433	2,135	1,185	2,113		8,963	2,308	1,324	2,273		0,348	2,400	1,413	2,475		0,844	2,665	1,020	2,870		31
1,331	24	1,307	(*)	(*)	1,449	20	1,419	(*)		1,555	30	1,525	(*)		1,029	33	1,508	(*)	(*)	32
-654				-455	-645				-653	-594				-694	-692				-692	33
0,022	147	4,633	1,222	18	0,226	181	4,759	1,242	44	0,003	185	4,485	1,260	42	0,050	163	4,084	1,285	18	34
826	03	210	28	19	341	70	190	38	44	331	05	183	29	42	282	46	188	29	18	35
1,343	(*)	147	1,154	(*)	1,347	1	142	1,204	(*)	1,857	1	117	1,239	(*)	1,362	1	95	1,286	(*)	36
4,244	84	4,201			4,547	121	4,427			4,815	120	4,185			4,916	115	4,801			37
828	183	223	20	111	640	150	250	21	128	570	100	264	26	136	694	109	204	31	141	38
311	94	125	21	111	309	53	116	10	125	311	55	100	10	129	330	63	122	15	133	39
211	108	05	5	(*)	240	97	134	6	3	208	106	148	5	6	255	104	122	13	5	40
547	444	127	32	244	011	379	128	20	284	1,002	540	139	26	206	1,022	549	145	26	289	41
401	854	51	10	41	491	379	63	15	63	572	437	65	14	55	604	464	00	13	62	42
345	81	00	11	192	385	96	61	10	219	394	98	61	18	225	385	108	00	10	208	43
38	0	15	5	11	35	6	14	3	18	37	5	13	3	17	48	5	13	3	19	44

Implicit price deflators ¹

122.1	142.7	134.6	129.3	144.9	143.0	149.7	141.4	135.7	145.7	153.8	164.7	152.9	143.7	152.3	164.8	170.6	166.6	151.1	171.6	45
135.0	149.6	131.8	128.3	151.3	143.5	150.5	141.3	135.7	148.0	163.0	160.0	153.1	149.7	168.1	165.2	171.4	165.8	153.1	163.4	46
733.8	133.6				139.8	159.8				140.4	190.4				155.5	168.5				47
146.3	148.2	137.0	129.5	162.4	148.5	155.8	146.1	135.8	162.9	159.0	107.8	109.3	143.0	160.8	171.0	170.2	172.8	153.8	163.1	48
132.7	132.7	132.4	134.5		140.0	139.0	141.3	149.2		149.5	147.3	151.7	153.8		160.2	156.3	163.8	165.4		49
146.7	173.2	140.3	128.7	162.4	157.0	179.3	155.4	135.2	150.9	170.0	155.3	168.7	142.7		169.5	180.4	161.4	151.5	163.1	50
126.8	130.3	105.1	129.1	123.9	134.2	147.2	135.4	135.3	129.9	143.7	138.8	143.2	142.1		145.5	155.0	147.5	152.5	161.8	51
124.9	124.6	128.2	123.9	122.9	131.0	135.3	130.0	132.3	129.9	145.5	145.4	145.3	141.1		128.2	155.1	157.2	155.4	150.2	52
136.3	131.3	120.5	129.9	129.1	130.1	140.3	138.2	148.8	137.5	149.2	160.5	149.5	148.1		147.2	169.9	162.2	160.5	150.0	53

Business capital consumption allowances (BCC) ¹

3,798					3,290					3,911					4,010					54
2,119					3,361					2,060					2,934					55

Table 2.—Business and Government Expenditures for Air and Water Pollution Abatement in Current and Constant (1972) Dollars and Selected Implicit Price Deflators

	Air							Water						
	1972*	1973*	1974*	1975*	1976*	1977*	1978*	1972*	1973*	1974*	1975*	1976*	1977*	1978*
Millions of current dollars														
Business (line 6)	4,276	5,579	6,888	8,219	9,915	9,788	10,654	4,986	5,698	6,175	7,012	8,248	9,351	10,499
On capital account (line 7).....	2,044	3,527	3,617	4,410	4,610	4,834	5,003	2,770	3,142	3,145	3,430	3,965	4,364	4,008
Motor vehicle emission abatement.....	225	330	444	770	663	1,138	1,352	1,508	1,765	1,670	2,382	2,743	2,786	2,781
Plant and equipment expenditures ¹	2,405	3,179	3,543	3,790	3,953	3,693	3,642	1,262	1,376	1,475	1,048	1,222	1,578	1,227
Electric utility cooperatives.....	14	12	31	49	63	73	00	5	8	7	6	9	0	12
Residential systems ²								1,280	1,369	1,250	1,060	1,230	1,563	2,119
Agricultural businesses ³								3	2	7	7	6	8	6
On current account (line 8).....	1,082	2,052	3,003	3,739	4,289	4,804	5,592	2,133	2,556	3,027	3,577	4,332	4,985	6,491
Private (line 9).....	1,012	2,022	2,905	3,679	4,227	4,780	5,504	1,004	1,208	1,454	1,731	2,089	2,408	2,627
Motor vehicle emission abatement.....	435	610	1,000	1,304	1,403	1,650	1,612	572	688	645	1,021	1,240	1,400	1,702
Manufacturing establishments.....	744	812	900	1,206	1,508	1,780	2,031	32	35	54	83	91	116	128
Privately owned electric utility establishments.....	220	373	700	853	811	840	966	265	201	325	288	425	580	673
Other nonmanufacturing establishments.....	204	227	200	332	410	462	566	195	200	228	247	205	205	223
Residential systems ²								(*)	(*)	(*)	(*)	(*)	(*)	(*)
Agricultural businesses ³								(*)	(*)	(*)	(*)	(*)	(*)	(*)
Government enterprise (line 10).....	20	30	08	00	72	75	88	1,128	1,315	1,573	1,845	2,104	2,505	2,830
Publicly owned electric utilities.....	20	30	08	00	72	75	88	4	6	5	7	8	10	11
Public sewer systems ⁴								1,124	1,306	1,567	1,838	2,104	2,494	2,819
Other.....								(*)	(*)	(*)	(*)	(*)	(*)	(*)
Government (line 12)	125	141	171	285	282	319	289	3,501	3,974	4,833	5,783	6,349	6,436	8,008
Federal (line 13).....	50	47	54	88	185	106	87	75	132	186	271	287	280	300
Federal, excl. highway erosion abatement.....	36	47	50	88	106	106	87	70	120	182	260	282	274	284
Highway erosion abatement.....								5	12	4	5	5	6	7
State and local (line 14).....	(*)	(*)	(*)	1	1	1	1	171	171	189	210	204	180	206
State and local, excl. highway erosion abatement.....	(*)	(*)	(*)	1	1	1	1							
Highway erosion abatement.....								171	171	189	210	204	180	206
Government enterprise fixed capital (line 15).....	00	08	114	117	178	203	192	3,255	3,470	4,500	5,382	5,886	5,007	7,535
Publicly owned electric utilities.....	00	08	114	117	178	203	192	48	08	88	74	65	09	130
Public sewer systems ⁴								3,207	3,462	4,412	5,298	5,821	5,874	7,375
Other.....														
Millions of constant (1972) dollars														
Business (line 26)	4,378	5,256	6,093	8,032	8,721	8,834	9,841	4,986	5,394	5,031	5,965	6,578	6,534	6,816
On capital account (line 27).....	2,044	3,408	3,152	4,474	3,324	3,244	3,240	2,770	2,926	2,030	2,505	3,237	2,871	2,997
Motor vehicle emission abatement.....	225	330	419	670	787	800	875	1,508	1,638	1,535	1,781	1,960	1,888	1,740
Plant and equipment expenditures ¹	2,405	3,069	2,737	3,780	2,493	2,327	2,323	1,262	1,288	5	4	8	0	8
Electric utility cooperatives.....	14	12	26	35	43	47	41	5	8	3	6	5	5	3
Residential systems ²								1,230	1,260	1,074	806	857	982	1,247
Agricultural businesses ³								3	3	6	6	5	5	3
On current account (line 30).....	1,682	1,847	1,801	3,158	2,397	2,400	2,701	2,133	2,378	2,411	2,401	2,743	2,943	3,119
Private (line 31).....	1,612	1,822	1,679	3,125	2,368	2,400	2,678	1,004	1,138	1,140	1,185	1,824	1,418	1,526
Motor vehicle emission abatement.....	435	600	789	900	835	875	1,086	572	635	648	671	780	847	891
Manufacturing establishments.....	744	741	678	730	888	890	963	32	33	41	40	43	42	53
Privately owned electric utility establishments.....	220	308	293	330	232	241	272	265	245	247	250	293	314	350
Other nonmanufacturing establishments.....	204	208	189	203	238	240	290	105	205	209	214	315	224	220
Residential systems ²								(*)	(*)	(*)	(*)	(*)	(*)	(*)
Agricultural businesses ³								(*)	(*)	(*)	(*)	(*)	(*)	(*)
Government enterprise (line 32).....	20	25	23	24	20	30	33	1,328	1,341	1,204	1,387	1,419	1,525	1,585
Publicly owned electric utilities.....	20	25	23	24	20	30	33	4	6	4	5	5	6	6
Public sewer systems ⁴								1,124	1,234	1,204	1,332	1,414	1,519	1,587
Other.....								(*)	(*)	(*)	(*)	(*)	(*)	(*)
Government (line 34)	125	134	136	147	191	195	183	3,501	3,494	4,140	4,823	4,739	4,480	6,964
Federal (line 35).....	50	48	44	83	70	68	48	75	124	160	210	198	203	188
Federal, excl. highway erosion abatement.....	36	45	40	83	70	68	48	70	120	163	212	186	188	185
Highway erosion abatement.....								5	4	3	3	4	4	3
State and local (line 36).....	(*)	(*)	(*)	(*)	1	1	1	171	165	137	147	142	117	95
State and local, excl. highway erosion abatement.....	(*)	(*)	(*)	(*)	1	1	1							
Highway erosion abatement.....								171	165	137	147	142	117	95
Government enterprise fixed capital (line 37).....	00	08	02	84	121	129	115	3,255	3,415	3,835	4,361	4,427	4,183	4,881
Publicly owned electric utilities.....	00	08	02	84	121	129	115	48	04	67	49	42	68	70
Public sewer systems ⁴								3,207	3,352	3,771	4,211	4,384	4,128	4,732
Other.....														
Selected implicit price deflators ⁵														
Plant and equipment expenditures (see above, business, capital account) ⁶	100.0	103.6	122.1	130.9	144.1	164.1	108.8	100.0	100.5	122.2	182.0	139.0	146.1	158.8
Manufacturing, privately owned electric utility, and other non-manufacturing establishments (see above, business, current account) ⁶	100.0	115.2	170.2	187.1	190.0	210.6	224.4	100.0	100.5	130.8	153.8	164.7	183.7	194.7
Public sewer systems (see above, business, current account) ⁴								100.0	106.5	124.3	143.2	162.5	164.2	177.0
Public sewer systems (see above, government, fixed capital) ⁴								100.0	107.5	117.2	124.2	132.8	143.8	150.2

* Revised. * Preliminary. * Less than \$500,000.

1. Line numbers correspond to those in Table 1.

2. See SURVEY OF CURRENT BUSINESS, June 1979, consists of manufacturing, privately owned electric utilities, and other nonmanufacturing companies.

3. Consists of private septic systems and sewer connections linking household plumbing to street sewers.

4. Feedlot operations only, as per footnote 1 of this article.

5. Public sewer systems consist of treatment plants, collection sewers, interceptor sewers, pumping stations, and dry waste disposal plants.

6. Current-dollar estimates divided by constant (1972) dollar estimates.

have been preferential to specific technologies, have limited the ability of purchasers to alter pollution abatement and waste disposal behavior in response to price change. There were several substantial compositional shifts during 1972-78.² Only one, however, had an appreciable effect on the PAC implicit price deflator: the increase in the share of PAC spending for emission abatement devices on cars and trucks purchased by consumers and business, a low-priced (in the sense explained above) PAC component.

Real PAC spending.—Real spending for PAC increased \$1.2 billion in 1978, twice the small increase in 1977. One-half of the increase in 1978 was for capital spending by government for water PA (public sewer systems and other government enterprise fixed capital); the remaining one-half was for current-account spending by business for air and water PA and collection and disposal of solid waste (labor, materials, and services; including those purchased by government enterprises). Other changes shown in table 1 were smaller and offsetting. Spending by consumers for durables for air PA (emission abatement devices for cars, pick-up trucks, and vans) increased \$0.1 billion. Capital spending by business for water PA increased \$0.1 billion; offsetting this, the corresponding capital component for air PA decreased \$0.1 billion. The largest changes at the finer level of detail shown in table 2 for business and government expenditures for air and water PA were offsetting. Residential systems capital expenditures for water PA (septic tanks and drainage fields, and connections to public sewers) increased \$0.3 billion, and new plant and equipment expenditures by manufacturing and nonmanufacturing companies for air and water PA decreased \$0.3 billion.

Virtually all of the increase in government enterprise capital spending was for public sewer systems, which in-

Table 3.—Pollution Abatement and Control Expenditures (Total and Selected Components) in Current and Constant (1972) Dollars, Implicit Price Deflator, and Price Indexes: Percent Change From Preceding Year

	1972-77 average annual rate ¹	1978	1979	1975	1976	1977	1978*
Pollution abatement and control-total:							
Current dollars.....	15.1	20.0	17.2	17.1	11.5	9.9	12.6
1972 dollars.....	5.7	12.7	5.5	7.8	5.3	2.4	4.9
Implicit price deflator.....	8.9	8.5	18.8	8.0	5.8	7.3	7.4
Chain price index.....	6.4	17.4	8.0	6.0	7.4	7.4	7.4
Fixed-weighted price index.....	8.1	6.4	17.1	8.0	6.0	7.5	7.5
Business capital-air:							
Current dollars.....	13.2	23.4	8.2	20.8	2.2	0.6	2.8
1972 dollars.....	4.3	28.9	-6.7	0.2	-4.3	0.6	-3.1
Implicit price deflator.....	9.1	3.5	16.0	10.0	4.7	6.0	6.1
Chain price index.....	6.4	17.4	8.0	6.0	7.4	7.4	7.4
Fixed-weighted price index.....	8.3	3.5	16.7	11.8	5.3	6.3	6.4
Business capital-water:							
Current dollars.....	0.4	13.2	2.2	9.1	18.8	6.0	12.7
1972 dollars.....	7.7	5.4	-10.5	-9.6	8.9	1.5	4.4
Implicit price deflator.....	8.7	7.4	11.8	18.1	8.7	7.4	7.6
Chain price index.....	6.0	11.0	10.0	10.0	6.6	7.0	7.5
Fixed-weighted price index.....	6.8	5.9	13.0	10.4	7.3	7.5	7.7
Business current account, private-air:							
Current dollars.....	34.3	25.4	48.1	22.9	14.9	18.3	14.9
1972 dollars.....	8.6	13.0	3.1	13.6	18.9	3.9	8.5
Implicit price deflator.....	14.2	11.0	43.7	9.1	3.8	9.0	6.0
Chain price index.....	10.7	10.7	58.7	6.1	4.9	8.1	6.0
Fixed-weighted price index.....	14.7	10.7	47.3	5.6	4.8	8.9	6.1
Business current account, private-water:							
Current dollars.....	16.9	10.8	20.9	19.1	20.7	19.3	13.5
1972 dollars.....	7.1	13.3	7.7	3.4	11.8	7.1	7.6
Implicit price deflator.....	11.9	5.7	20.0	15.2	8.0	11.3	5.3
Chain price index.....	8.2	20.4	15.4	15.4	7.7	11.3	5.2
Fixed-weighted price index.....	11.7	0.3	18.5	14.9	7.6	11.0	5.1

* Preliminary.

1. Compounded annually; not calculated for chain index because it is defined for adjacent years only.

creased more in 1978 than in any year during 1972-77. Several factors are consistent with an increase in 1978 but do not fully explain the record size: (1) the need for additional treatment capacity for sewage from new housing units, (2) the availability of Federal funds for construction of sewage treatment plants and State and local funds for construction of such plants and other public sewer system facilities, and (3) the requirement that all municipalities meet secondary treatment standards by the early 1980's.³ The number of new housing units with connections to public sewer systems increased in 1976 and increased rapidly in 1977 and 1978, intensifying the need for treatment capacity. Federal funding has accounted for about half of the financing for public sewer system construction in recent years; the other half has been financed by State and local governments, largely through long-

term borrowing. Federal grants for construction of treatment plants (see water PA, table 4) and State and local long-term borrowing for public sewer systems and water supply treatment, an indicator of borrowing to finance public sewer systems, each increased in 1976 and in 1977, but decreased in 1978. The increases probably had a positive effect on construction of public sewer systems in 1978 while the decrease had little effect, reflecting a time lag between financing and construction.⁴ The effect of the third factor, the requirement to meet secondary treatment standards, is difficult to determine. The regulatory deadline was July 1977, but it was difficult to enforce, many municipalities failed to meet it, and extensions have been granted into the early 1980's. Because extensions have been on a case-by-case basis, municipalities now have different deadlines, some of which occurred in 1978.

Other changes in 1978 spending are consistent with changes in underlying

2. See "Pollution Abatement and Control Expenditures in Current and Constant Dollars, 1972-77," in the February 1979 Survey of Current Business for discussion on changes in real spending during 1972-77, which the compositional shifts reflect. For changes in 1978, see the next section of the present article. Important Federal laws regulating pollution abatement and waste disposal practices include: the 1970 amendments to the Clean Air Act, the 1972 amendments to the Federal Water Pollution Control Act, the 1977 amendments to both these acts, and the 1965 Solid Waste Disposal Act and amendments of 1970 and 1976.

3. Secondary treatment is largely biological; bacteria degrade sewage to less harmful substances. Public sewer systems consist of sewage treatment plants, collection sewers, interceptor sewers, pumping stations, and dry waste disposal plants. Up to 75 percent (except when innovative technology is involved) of expenses for treatment plant construction can be financed with Federal funds; the other facilities in public sewer systems must be financed largely by State and local governments.

4. The relationship between changes in funding and changes in public sewer system construction is more complicated than annual changes suggest. Nevertheless, in only one year during 1972-78 have increases in Federal, State, and local funding been followed by a decrease in public sewer system construction.

Table 4.—Federal Grants to State and Local Governments for

Line		1972 *					1973 *					1974 *				
		Total	Air	Water	Solid waste	Other and unallo- cated	Total	Air	Water	Solid waste	Other and unallo- cated	Total	Air	Water	Solid waste	Other and unallo- cated
Millions of																
1	Pollution abatement and control.....	1,024	58	921	16	31	867	40	875	13	20	2,241	53	2,171	8	15
2	Pollution abatement.....	869	(*)	850	9	1	870	(*)	813	3	5	2,111	1	2,110	1	-----
3	Regulation and monitoring.....	60	30	21	3	2	70	43	30	2	2	61	45	44	2	(*)
4	Research and development.....	95	17	44	10	28	96	5	23	8	13	30	7	15	5	8
Millions of																
5	Pollution abatement and control.....	1,024	56	921	15	31	866	40	863	12	19	1,984	46	1,844	7	9
6	Pollution abatement.....	850	(*)	850	3	1	758	(*)	755	2	1	1,794	(*)	1,792	1	-----
7	Regulation and monitoring.....	63	30	21	3	3	77	40	28	2	3	77	30	37	2	(*)
8	Research and development.....	90	17	44	10	28	61	0	31	8	17	34	6	10	4	8

* Revised. * Preliminary. * Less than \$500,000.

economic activity. The increase in current-account spending by business for air and water PA and solid waste collection and disposal is consistent with increases in the capital stocks for PA and solid waste collection and disposal. The increase in spending by consumers for durables for air PA largely reflects an increase in the number of new vehicles purchased. The changes in spending by business on capital account for water PA and air

PA are net changes among components not discussed separately except for residential systems capital expenditures and new plant and equipment expenditures for air and water PA. The increase in residential systems capital expenditures reflects an increase in the number of housing units completed for connection to such systems, and the decrease in new plant and equipment expenditures for air and water PA reflects the absence until 1982 of major regulatory

deadlines for air and water PA.

Prospect for real PAC spending.—Analysis of trends in the 7-year PAC series and a review of regulatory deadlines for PA indicate continued increases in total real PAC spending in 1979 and 1980, with an increase in 1979 of about 3 percent. Current-account spending by business will probably increase in absolute terms more than other components of spending for PAC, increasing by a similar amount in 1979

Pollution Abatement and Control in Current and Constant (1972) Dollars

1975 *					1976 *					1977 *					1978 *					Line
Total	Air	Water	Solid waste	Other and unallo- cated	Total	Air	Water	Solid waste	Other and unallo- cated	Total	Air	Water	Solid waste	Other and unallo- cated	Total	Air	Water	Solid waste	Other and unallo- cated	
current dollars																				
2,872	55	2,798	11	15	2,384	65	2,235	11	23	4,445	41	3,943	36	28	4,098	73	3,875	26	26	1
2,723	1	2,722	2	1	2,186	1	2,182	4	2	2,804	1	2,797	6	-----	3,790	-----	3,732	7	1	2
102	47	52	3	(*)	181	99	85	3	4	193	65	129	8	5	290	66	123	15	8	3
47	8	19	6	14	45	0	18	4	17	61	7	18	4	28	67	8	20	4	20	4
constant (1972) dollars																				
2,287	44	2,242	9	13	2,444	49	2,478	9	17	2,836	42	2,795	10	20	2,853	46	2,468	16	24	5
2,190	(*)	2,187	2	1	2,404	1	2,398	2	1	2,671	1	2,667	4	-----	2,678	-----	2,378	5	1	6
70	37	40	2	(*)	109	25	98	2	3	120	87	25	4	3	129	41	73	0	4	7
38	7	15	5	11	25	5	14	3	13	37	6	13	3	17	41	5	14	3	19	8

as in 1978 and for the same reason. New plant and equipment expenditures for PA will probably show the second largest increase in 1979, reflecting an increase in total plant and equipment expenditures (conventional plant and equipment and that for PA are complementary and are often purchased together). Spending for government enterprise fixed capital will probably decrease in 1979, reflecting a decrease in 1978 Federal, State, and local funding for

public sewer system construction. Other components of PAC, together, will probably register a small increase.

Revision of estimates

New estimates of maintenance costs for passenger cars reported in EPA's *The Cost of Clean Air and Water Report to Congress, August 1979* resulted in downward revisions in personal consumption expenditures for nondurables and business expenditures for operating

and maintaining emission control devices on motor vehicles ranging from \$0.1 billion in 1972 to \$0.3 billion in 1977. In 1972-76 there were no large offsetting upward revisions. Components of air PA capital spending and business and government expenditures for solid waste collection and disposal were revised upwards \$0.2 billion in 1977. Other revisions totaled a net \$0.1 billion increase resulting in almost no net change in 1977.